PRELIMINARY PROPOSAL

For Study Code AVS-?-??-New to the US Army Corps of Engineers (FY05)

Evaluation of Lethal Removal as an Avian (Gull) Predation Deterrent Technique

Project Leader:

Robert Stansell

U.S. Army Corps of Engineers
Fish Field Unit
Bonneville Dam, Cascade Locks, OR. 97014
(541) 374-8801, Fax (541) 374-8372

Anticipated Duration:
March through June 2005, 2006

August 3, 2004

Project Summary

Goals:

The goal of this evaluation is to determine if lethal removal is an effective deterrent to avian (gull) predation on juvenile salmonids passing Lower Columbia River dams as opposed to passive and hazing techniques.

Objectives:

1. Evaluate passive, hazing, and lethal avian predation deterrent techniques at Lower Columbia River dams for effectiveness in reducing juvenile salmonid loss to avian predators from March through June of 2005 and 2006.

Methodology

Gull numbers and possibly the number of juvenile salmonids taken by gulls will be recorded by observers at various locations where significant avian predation is known to occur at Bonneville and The Dalles dams. A random block test design will be used to collect data 4 days per week at each project during lethal removal activities (by Wildlife Services personnel (WS)) and hazing activites between April and June. Additional observations during times when only passive deterrents are present may be conducted. An ANOVA will be run to determine any statistical difference between lethal and hazing activities on two measurements. The first measurement is the proportion of gulls initially driven away (number of gulls present after the activity/number of gulls originally present before the activity). The second measurement is the proportion of gulls returning over time, likely every 15 minutes for up to two hours. Observers will record the number of gulls initially present, the number of gulls present after the activity (about 1 minute after), and the number present every 15 minutes for two hours. In addition, the number of fish (primarily juvenile salmonids) taken by gulls during the one to two hours may be counted/estimated during those two hours. Observations will occur at Bonneville and The Dalles dam at the location with the most gull activity. The activity that results in more gulls initially driven away and fewer gulls returning over time will be considered successful in deterring gull predation. Behavioral information, such as gulls flying under lines, and gulls avoiding WS vehicles, will be recorded and interpreted.

Relevance

Avian predation on juvenile salmonids passing dams on the Lower Columbia River has been known to occur for years. Before the listing of several species of salmon as endangered, little action was taken to prevent or reduce this predation. The 2000 National Marine Fisheries Service Biological Opinion for the operation of the Federal Columbia River Hydropower System, RPA Action #101 requests that the Corps "implement and maintain effective means of discouraging avian predation at all forebay, tailrace, and bypass outfall locations where avian predator activity has been observed at FCRPS dams." They request this activity from April through August. The U.S. Army Corps of Engineers Portland District has contracted United States Department of Agriculture Wildlife Services (WS) to install and maintain avian lines over the tailraces of each powerhouse and spillway at all three Lower Columbia River dams (Bonneville, The Dalles, and John Day). The Corps has also installed a water cannon at Bonneville's second powerhouse (PH2) juvenile bypass (JBS) outfall and John Day's JBS outfall. More recently, avian lines were installed over the John Day JBS outfall and the new Bonneville PH2 corner collector (CC) outfall. In addition to these passive deterrents, the Corps has contracted WS personnel each year to conduct hazing and lethal removal of avian predators. The United States Fish and Wildlife Service (USFWS) has issued lethal removal permits over the years, however, in 2004, no lethal removal permit was issued. Several public groups object to lethal removal of migratory avian species, noting that there is little or no documentation of the effectiveness such measures have in aiding the recovery of ESA-listed salmon species. Although several ongoing studies have taken place concerning avian predation in the Columbia and Snake Rivers and the Columbia Estuary (Collis et al., 2001 and 2002), none have specifically addressed the effectiveness of lethal removal techniques compared to passive and hazing techniques.

Project Description

Background

Avian predation on juvenile salmonids passing dams is a factor contributing to the loss of endangered salmonids migrating down the Columbia River, and is one of the most visible. Although some work has been done at the dams (Ruggerone, 1986; Jones et al., 1994, 1995, 1996, 1997), much of the recent work has focused on the reservoirs and estuary (Collis et al., 2002, 2001). Collis et al. (2002) note that gulls that nest on islands in the lower Columbia River have a diet that mostly consists of anthropogenic food and few salmonids, although on the island closest to a dam (Little Memaloose near John Day Dam) salmonids made up about 15% of their diet. Obviously, gulls that are seen hunting at the JBS outfall of a dam are catching primarily juvenile salmonids (except in the late fall, when juvenile shad predominate). Whether it is the same individual gulls that hunt at the dams or whether cycling through feeding locations occurs is unknown.

Objectives/Methodology

Objective 1: Evaluate passive, hazing, and lethal avian predation deterrent techniques at Lower Columbia River dams for effectiveness in reducing juvenile salmonid loss to avian predators from March through June 2005 and 2006.

Gull numbers and possibly the number of juvenile salmonids taken by gulls will be recorded by observers at various locations where significant avian predation is known to occur at Bonneville and The Dalles dams. A random block test design will be used to collect data 4 days per week at each project during lethal removal activities (by Wildlife Services personnel (WS)) and hazing activites between April and June. Additional observations during times when only passive deterrents are present may be conducted. An ANOVA will be run to determine any statistical difference between lethal and hazing activities on two measurements. The first measurement is the proportion of gulls initially driven away (number of gulls present after the activity/number of gulls originally present before the activity). The second measurement is the proportion of gulls returning over time, likely every 15 minutes for up to two hours. Observers will record the number of gulls initially present, the number of gulls present after the activity (about 1 minute after), and the number present every 15 minutes for two hours. In addition, the number of fish (primarily juvenile salmonids) taken by gulls during the one to two hours may be counted/estimated during those two hours. Observations will occur at Bonneville and The Dalles dam at the location with the most gull activity. The activity that results in more gulls initially driven away and fewer gulls returning over time will be considered successful in deterring gull predation. Behavioral information, such as gulls flying under lines, and gulls avoiding WS vehicles, will be recorded and interpreted.

Justification of the proposed study area

Bonneville, The Dalles, and John Day dams have had non-lethal and lethal avian control measures in place for several years to help deter avian predation on juvenile salmonids passing the dams. An evaluation of the effectiveness of lethal removal of avian predators is needed to determine whether to continue this practice.

Statistical justification of the required sample size, number of tests, and replicates

Lethal removal will be directly compared to hazing in a random block design test; 20 lethal and 20 hazing at Bonneville and 20 lethal and 20 hazing at The Dalles dams. Gull numbers vary by hour and day across the season. Previous years' work will be used to obtain standard deviations for determining if this sample size is sufficient.

Numbers and species and source of required fish

Not applicable.

Limitations of proposed methodology and expected difficulties

We will be heavily relying upon WS personnel to conduct the lethal and hazing procedures according to our randomized schedule, which may not be convenient nor economically prudent from their perspective. Estimating the number of gulls present is somewhat difficult when many are flying in and out of an area. Defining the sampling area and consistency between observers should limit these problems. All sites will likely have passive line arrays installed, and therefore gull numbers will already be lower during hazing and lethal removal periods than if no lines were present. It will be difficult or impossible to separate any long-term effects of lethal removal and hazing. It will be difficult to see actual fish taken and/or missed from most locations if this task is attempted, as the gulls are quick at consuming juvenile salmonids and some of the distances involved are great. Whether or not those salmonids taken were already moribund or in some other way unlikely to survive even if not preyed upon will be undetermined.

Expected results and applicability

By documenting the number of avian predators moved away by lethal methods and the time before avian predators return, comparing these figures to those collected during hazing activities it may be possible to determine whether lethal practices are effective. The results of this study can be applied to most other large hydroelectric facilities that deploy and conduct similar avian predation deterrent measures.

Schedule

Observations will occur April through June at Bonneville and The Dalles dams. A specific schedule will be supplied to WS personnel detailing when lethal take and hazing tactics are to be used at specified sites, possibly even written into their contract with the Corps. This is not the usual procedure, as WS personnel usually roam the projects and determine when and where to use various tactics depending upon their observation of gull numbers around the projects.

Facilities and Equipment

Observers will use binoculars, digital cameras, and digital video cameras, to aid in counting gulls. A method may be tested using a digital video camera (or two) record gull activity before, during, and after hazing or lethal removal; the data may be collected and interpreted both manually and with an automated detection program. WS personnel typically use shotguns for lethal removal of gulls and various pyrotechnics (such as cracker shells and screamers) to haze/chase gulls away.

Impacts

This study may reduce the effectiveness of WS avian deterrent actions since it limits the frequency and/or times animals can be hazed or killed.

Collaborative Arrangements and/or Sub-Contracts

FFU personnel will work with Wildlife Services personnel closely to schedule and observe results of the various deterrent methods used. Wildlife Services will be responsible for obtaining lethal take permits from the USFWS.

List of Key Personnel and Project Duties

Robert Stansell – Team Leader - Oversees studies design, data analysis, and report writing, participates in some observation and data analysis.

Bill Nagy - Biological Technician - Data collection, observations, deployment and development of video system to capture and auto-count gulls.
Sallie Jones, Mike Jonas, John Dalen, Marie Kopka - Biological Technicians – Data collection, observations, reviewing video, report writing.
Wildlife Services personnel – Responsible for conducting lethal removal and hazing of gulls.

Technology Transfer

We plan to transfer information obtained from our analysis in the manners listed below. The information will be used by federal and state agencies, Native American Tribes, and the public to make management decisions whether to include or delete lethal removal from avian predator control measures in the future at Corps dams. Technologies that may be evaluated include digital video image capturing and auto-target enumeration of gulls.

1. Presentations to the Anadromous Fish Passage Evaluation Program (AFEP) in November 2005 and presentations to fisheries agencies, tribes, and the public as requested by the USACE.

2. Expected draft report for 2005 and 2006 work to AFEP by April 2007 and final report by August 2007.

3. Presentations to the Army Corps of Engineers staff and study review groups.

4. Presentations at professional meetings and publication of information in peer-reviewed journals.

List of References /Literature Cited

2000. Federal Columbia River Power System Biological Opinion, 2000.

Collis, K., D. Roby, D. Craig, B. Ryan, and R Ledgerwood. 2001. Colonial waterbird predation on juvenile salmonids tagged with passive integrated transponders in the Columbia River Estuary: vulnerability of different salmonid species, stocks, and rearing types. Transactions of the American Fisheries Society 130:385-396.

Collis, K., D. Roby, D Craig, S. Adamany, J. Adkins, and D. Lyons. 2002. Colony size and diet composition of piscivorous waterbirds on the lower Columbia River: Implications for losses of juvenile salmonids to avian predation. Transactions of the American Fisheries Society 131:537-550.

Jones, Sallie T., Gretchen M. Starke, and Robert J. Stansell. 1996. Predation by Birds and Effectiveness of Predation Control Measures at Bonneville, The Dalles, and John Day Dams in 1995. U.S. Army Corps of Engineers, CENPP-CO-SRF. 43 pp.

Jones, Sallie T., Gretchen M. Starke, and Robert J. Stansell. 1997. Predation by Birds and Effectiveness of Predation Control Measures at Bonneville, The Dalles, and John Day Dams in 1996. U.S. Army Corps of Engineers, CENPP-CO-SRF. 21 pp.

Jones, Sallie T., Gretchen M. Starke, and Robert J. Stansell. 1998. Predation by Birds and Effectiveness of Predation Control Measures at Bonneville, The Dalles, and John Day Dams in 1997. U.S. Army Corps of Engineers, CENPP-CO-SRF. 22 pp.

Jones, Sallie T., Gretchen M. Starke, and Robert J. Stansell. 1999. Predation by Gulls and Effectiveness of Predation Control Measures at Bonneville, The Dalles, and John Day Dams, 1998. U.S. Army Corps of Engineers, CENPP-CO-SRF. 17 pp.

Ruggerone, G. 1986. Consumption of migrating juvenile salmonids by gulls foraging below a Columbia River dam. Transactions of the American Fisheries Society 115:736-742.